in the 1435-1525 MHz band (L-band) to safeguard its MAT systems.[102] The U.S. quantified its need to protect its MAT systems from interference in the L-band in detailed studies which it presented to numerous International Telecommunication Union-Radiocommunication Sector Study Groups. These studies show that it would not be feasible for a satellite service to share with MAT on a co-coverage, co-frequency basis. Indeed, the U.S. has taken necessary steps to relocate its own S-band MAT operations to frequencies above 2360 MHz, recognizing that co-frequency, co-coverage operation of satellite DARS and MAT is not practical.[103] Many of these U.S. MAT operations were relocated entirely from S-band to L-band.[104]

58. We now know that some of the MAT assignments in Canada are used to control remotely piloted vehicles (RPVs) which require reception at the aircraft as well as at land based stations.[105] In addition, some Canadian MAT systems are operating within a hundred miles of the U.S./Canada border, making them even more susceptible to interference from U.S. satellite DARS.[106] Although five of the 12 MAT frequency assignments in Canada lie below 2345 MHz, we note that at least three of those assignments are repeated on center frequencies above 2345 MHz. This may indicate that there is some flexibility in the MAT operations that will help our coordination efforts in the 2320-2345 MHz band.

4. Pioneer's Preference Requests

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102 Coordination threshold power levels to protect U.S. MAT systems are on the order of --181/-150 dB(W/m^2/4kHz) for low/high elevation angles. If satellite transmissions exceed this threshold, coordination would be required with every MAT system.

103 See Allocation Order, ¶ 16 and n. US328 to § 2.106 of the Commission's rules. See also Modification to Part 87, infra.

104 Unfortunately, this has had the unintended consequence of increasing coordination challenges in the L-band between foreign terrestrial digital audio broadcasting and U.S. MAT systems.

105 Two MAT frequency assignments below 2345 MHz are used to control RPVs. Such communications would be difficult to coordinate because as the aircraft maneuvers, the receiving antenna's position changes with respect to the ground base station, and the antenna could point directly toward a transmitting U.S. DARS satellite. The mobility of the receive antenna makes it harder to isolate it from the DARS satellite.

106 Successful coordination on a co-coverage basis with Canadian MAT operations located near the U.S./Canada border would require satellite DARS to operate on a non-co-frequency basis.

59. In the Notice, we solicited comment on three pending requests for pioneer's preferences filed by CD Radio, DSBC, and Primosphere.[107] No comments were filed on any of the satellite DARS pioneer's preference requests. On September 20, 1995, in compliance with new pioneer's preference rules,[108] CD Radio, DSBC, and Primosphere each filed a supplement to their respective requests.

60. By letter dated August 30, 1996, the Commission's Office of Engineering and Technology and the International Bureau requested that a specially convened panel of four satellite technology experts ("Panel") review the three satellite DARS pioneer's preference requests and recommend to the Commission whether each of the requests should be granted.[109] In a report dated November 18, 1996, the Panel unanimously recommended that no pioneer's preference be awarded. The Panel concluded that none of the applicants had demonstrated a seamless satellite DARS service and found that no award of a pioneer's preference could be justified on technical design grounds. On November 19, 1996, the Commission issued a Public Notice, requesting comments on the Panel report by December 3, 1996.[110]

61. Following the release of the Panel's report, all three pioneer's preference applicants withdrew their requests.[111] Accordingly, we do not consider whether to award any pioneer's preferences for satellite DARS.[112] While we do not need to discuss the Panel's recommendations and report, we commend the members of the Panel for their remarkable dedication and hard work during the several weeks in which they volunteered their expertise.

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107 See GEN Docket No. 90-357.

108 See ET Docket No. 93-266.

109 The experts on the Panel were: Dr. H. Donald Messer, Broadcast Satellite Program Manager at the U.S. Information Agency's Voice of America; John T. Gilsenan, Deputy Director for Radio Spectrum Policy at the U.S. Department of State; James E. Hollansworth, Telecommunications Specialist at the National Aeronautics and Space Administration; and William G. Long, Jr., a satellite expert with the Defense Information Systems Agency.

110 See Report No. SPB-67, Mimeo No. 70798.

111 See letter from CD Radio dated November 22, 1996; letter from DSBC dated December 3, 1996; and, letter from Primosphere dated December 5, 1996.

112 Despite the withdrawal of all the pioneer's preference requests, DSBC, Primosphere, and the National Association of Broadcasters each filed comments, dated December 3, 1996, that supported the Panel's recommendations. Additionally, CD Radio filed comments on that date stating that it disagreed with the panel's recommendation regarding CD Radio's pioneer's preference request, but explaining that CD Radio had nevertheless withdrawn its request in order to expedite the provision of satellite DARS.

5. Cut-off Issues

62. In light of the withdrawal of each request for pioneer's preference, and having determined that each DARS licensee will require 12.5 MHz, we must now determine whether to reopen the 25 MHz of spectrum that remains allocated primarily for satellite DARS to new applicants or allow only the existing applicants to resolve their mutually exclusive applications. Commenters urging reopening the cutoff for satellite DARS applications contend that it is necessary to ensure true competition and greater program diversity.[113] Cracker Barrel, for example, asserts that it would be interested in filing an application advocating a different transmission technology that it claims will allow more operators in less spectrum. It states that because the cut-off was three years ago, the Commission cannot be sure it has the best proposals before it. It also claims that the satellite DARS proceeding was "out of order" because applications were accepted before service rules were established. Because of this situation, Cracker Barrel complains it did not learn of the licensing process until the June 1995 Notice and thus it missed the 1992 cut-off. Cracker Barrel argues that the Commission has discretion under the public interest standard to reopen a cut-off in a given proceeding.[114]

63. Similarly, NAB asserts that technology has changed since the Commission opened and closed the application window for DARS. It states that licensing multiple applicants will bring more program diversity and more business capabilities to the service. It also argues that any equities favoring the current applicants do not justify preserving the cut-off. NAB, like Cracker Barrel, argues that the available spectrum can support additional operators.

64. Others, particularly the four current applicants, argue that the cut-off should stand. CD Radio asserts that reopening would be unlawful, inequitable, and unwise. It argues that cutoffs are reopened only in extraordinary circumstances that are absent here.[115] CD Radio and AMRC also stress that reopening would ignore the equities favoring the current applicants, including the significant time and money invested to establish satellite DARS. Citizens for a Sound economy, a non-applicant, added that reopening the cut-off could discourage future research and development of new services by allowing new applicants a "free ride" on the current applicants' investments.[116]

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113 Comments of Cracker Barrel at 7-8; NAB at 54.

114 Cracker Barrel Reply at 4.

115 CD Radio cites Florida Institute of Technology v FCC, 952 F. 2d 549, 553 (D.C. Cir 1992), in support of its positions.

116 Citizens for a Sound Economy at 5.

65. Primosphere argues that cut-offs are key to a successful satellite policy. They bring finality and certainty to satellite proceedings by limiting the universe of applicants, allowing them to prepare their cases against a limited set of opponents and expediting inherently complex and costly development of new services.[117] Similarly, DSBC argues that reopening the cutoff would contravene decades of satellite procedure. It states:

> Unlike its process in other services, the Commission invites applicants for new satellite services to submit their applications prior to the adoption of the technical and operational rules and often prior to a final decision on the threshold question of whether proceeding to authorize any one in the service is in the public interest. The Commission repeatedly has concluded that the technical complexity and the extraordinary lead time required uniquely in the satellite services requires this previously unprecedented approach.[118]

The purpose of this approach, DSBC explains, is to guarantee long-term industry involvement in identifying the best use of spectrum and most efficient technology, thereby expediting new services. DSBC argues that satellite companies invest enormous amounts of time and money to develop new technologies and services, in reliance on the finality and certainty afforded by cutoffs and licensing rounds. Absent cutoffs, these parties would lack the incentive to risk the substantial resources required to develop and offer new satellite services to the public.[119]

66. We agree with those commenters that assert that the Commission has authority to reopen cut-offs and that doing so in some circumstances has several important advantages, including allowing for new competitors to emerge. But we conclude that in this case, compelling policy reasons unique to satellite services militate against reopening the cut-off for satellite DARS license applications for the two licenses available.

67. Sound satellite licensing policy and precedent, and the equities of this particular proceeding support the use of cut-offs in here. In this satellite proceeding, as in others, applicants require some measure of certainty to justify the inherently long-term investment of resources required by complex and lengthy international allocation and coordination procedures that must be completed prior to inauguration of service. This unique feature of satellite services, combined with the need to most expeditiously provide new services to the public, outweigh any benefits that would accrue from accepting additional applications. Cut-

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117 Comments of Primosphere at 9.

118 Comments of DSBC at 45 citing Amendment of Parts 2, 22 & 25 of the Commissions Rules to Allocate Spectrum for and to Establish other Rules and Policies Pertaining to the Mobile Satellite Service for the Provision of Various Common Carrier Services, 6 FCC Rcd. 4900 (1991);

119 Comments of DSBC at 46.

off procedures provide a greater measure of certainty.[120] Given these unique factors in licensing satellite services, the Commission regularly establishes cut-offs, accepts applications and creates processing groups before service rules are adopted or even before specific operating frequencies are established.[121] We then rely heavily on the applicants to help develop service rules that allow them to share spectrum and expeditiously develop and deliver their new services to the public. We rely heavily on applicants to assist the U.S. in international fora to obtain spectrum allocations and we expect them to participate in the time consuming process of ITU notification and coordination. All of this activity requires significant expenditure of time and money by the applicants. Once we adopt rules, we permit applicants to amend their proposals to reflect compromises. This process expedites a complex and inherently risky venture, allowing license applicants to begin construction of their facilities immediately upon our grant of a license. The assertion by those opposing cut-offs that we do not accept applications before adopting service rules in other, very different types of services, does not justify reopening the cut-off in this satellite proceeding.

68. Reopening the cut-off in this case will not necessarily advance DARS technology. There is no reason to assume that applicants will implement outmoded technology or spend hundreds of millions of dollars to construct inefficient satellite systems. Furthermore, in any satellite service rulemaking proceeding, we always give pending applicants the opportunity to amend their applications to conform to the final rules. In reviewing applications for space station facilities, we require that proposals reflect "state-of-the-art" technology at the time of license grant.[122] In fact, CD Radio had amended its application substantially since 1990 and will have the opportunity to do so again to reflect the adopted rules. Although Cracker Barrel claims that its proposal could use less spectrum than that proposed by CD Radio, we conclude, as discussed previously,[123] that its proposal would not accommodate certain innovations such as spatial diversity.

69. Since CD Radio filed its original application in 1990, steps to implement the service have been well publicized. Both the government and the private sector worked to identify appropriate spectrum for satellite DARS at WARC- 92. Shortly after WARC-92, the Commission announced its intention to allocate spectrum domestically and to accept

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120 See Mobile Satellite Services, 6 FCC Rcd. 4900 (1991); LEOSAT Corp., 8 FCC Rcd 668, 670 (1993); PanAmSat Licensee Corp, DA 96-178 (International Bureau, released February 21, 1996).

121 See, e.g., Radio Determination Satellite Service, Gen Docket # 84-690; Big Leo Satellite Service, CC Docket # 92-166; Little Leo Satellite Service CC Docket # 92-76.

122 See Licensing of Space Stations in the Domestic Fixed-Satellite Service, 54 Rad. Reg. 2d 577 (P&F) (1983).

123 See, infra, Section B.2.

applications for operations in the S-band to be considered in conjunction with CD Radio's. Since 1992, only one entity, Cracker Barrel, has indicated interest in filing an application to provide satellite DARS.

70. Neither Cracker Barrel nor other commenters have presented compelling arguments to justify reopening the previously established cut-off for satellite DARS license applications. No commenter advocating reopening has shown any persuasive reason to depart from our satellite cut-off policy and precedent.

71. Consistent with our conclusion not to reopen the cut-off in this proceeding, we note that existing Commission rules preclude satellite DARS applicants from effecting a substantial change in beneficial ownership if they want to maintain their pre-cut-off status. Section 25.116 of the rules provides that any amended application substantially changing an applicant's ownership will be considered a newly filed application and thus would not fall within cut-off protection unless the applicant requests and is granted an exemption by the Commission.[124]

6. Specific Frequency Assignments and Satellite DARS Competition

72. We proposed in our Notice to authorize specific satellite DARS frequency assignments upon grant of satellite DARS authorizations to begin construction. There were mixed reactions to our approach. Primosphere, asserts that the Commission should initiate international coordination in conjunction with all licensed satellite DARS systems and should assign specific frequency blocks following the conclusion of this coordination.[125] DSBC proposes to permit licensees to select the frequency band it would like to employ at the time it certifies it has met the first milestone.[126] This is similar to CD Radio's initial proposal that each licensee notify the Commission of the specific frequency assignment it is using at the same time it certifies to the Commission it has met the milestone and launched its first spacecraft.[127] These alternative methods have one commonality; the exclusive frequency assignment for each satellite DARS licensee will not be known before and during the early stages of the coordination process. Indeed, it was necessary to initiate the coordination process with the ITU for each current satellite DARS system as though each system would operate over the entire 2310-2360 MHz band. Until specific frequency assignments are issued, coordination with adjacent countries for each satellite DARS system is burdensome for both the Commission and the licensees.

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124 47 CFR § 25.116(c)(2).

125 Primosphere Reply at 24. See also Primosphere Ex Parte statement dated September 25, 1996.

126 DSBC Reply at 51.

127 See Notice, ¶ 84.

73. As discussed above, there is sufficient spectrum in the S-Band to license only two satellite DARS systems. Dividing the available 25 MHz of spectrum into four equal segments among the four applicants would result in exclusive frequency assignments of only 6.25 MHz for each satellite DARS applicant. Because we have found that a viable and competitive satellite DARS service will require 12.5 MHz, we can license only two systems. The 2320-2345 MHz band that will remain allocated for satellite DARS will be divided into two equal 12.5 MHz segments (2320-2332.5 MHz and 2332.5-2345 MHz). We will award the two licenses for satellite DARS by using competitive bidding to resolve mutual exclusivity.[128] Satellite DARS applicants that are winning bidders will have 30 days following the conclusion of the auction in which to amend their applications to conform with the satellite DARS service rules adopted today.

74. Using the calculation methods provided in the comments, the satellite DARS licensees will be able to provide 19 to 44 channels of CD quality audio per system in the authorized 12.5 MHz of spectrum. Sufficient spectrum is available for two spatially diverse systems.[129] Although we decide not to reopen the processing round for satellite DARS, we are not by our action today excluding all other potential DARS providers. Indeed, it may be possible to lease channels or purchase advertising time from the licensed satellite DARS providers.[130]

75. CD Radio had proposed that satellite DARS system operators be permitted temporarily to occupy frequency assignments other than their own, provided that their transmissions can be reconfigured to return to and thereafter use only their own frequency assignment upon launch of the satellite operated by the licensee assigned to the temporary frequency.[131] DSBC objected to this proposal, arguing that while temporary use by the first operator(s) might avoid having frequencies lie fallow for a short time, prescribing temporary use may be disruptive and contrary to the public interest. It asserted that the temporary operator could be faced with reducing its services, discontinuing its service to its customers, or seeking to utilize frequencies that are rightfully assigned to another licensee once the temporary spectrum is no longer available for use.[132] Primosphere, supports CD Radio's original proposal to authorize interim frequency assignments.[133]

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128 See, infra, Section G, regarding auction rules for satellite DARS licensees.

129 CD Radio and Primosphere propose to use spatial diversity in their applications for satellite DARS.

130 See Primosphere Reply at 8.

131 See Notice, ¶¶ 86-87.

132 See Notice, ¶¶ 86-87.

133 Primosphere Comments at 44.

76. Upon review of the record, we have decided not to authorize interim operations. We have concluded that 12.5 MHz is necessary to implement a viable satellite DARS service. Nothing in the comments indicates that additional spectrum, or an interim assignment, is necessary to implement a viable system. Conversely, we find that an interim assignment could be disruptive and contrary to public interest because of possible service interruption or reduction. We therefore adopt our original proposal not to authorize interim frequency assignments.

77. Although spectrum constraints limit us to licensing just two satellite DARS systems at this time, our licensing approach nonetheless provides the opportunity for a competitive DARS service. Our goal is to create as competitive a market structure as possible, while permitting each DARS provider to offer sufficient channels for a viable service. In the Notice, we pointed out that "satellite DARS will face competition from terrestrial radio services, CD players in automobiles and homes, and audio services delivered as part of cable and satellite services," and asked whether these delivery media, coupled with fewer than four DARS providers, could ensure an effectively competitive audio services market.[134]

78. Other audio delivery media are not, of course, perfect substitutes for satellite DARS. These media and satellite DARS all differ with respect to the programming menu (terrestrial radio can provide local programming and satellite DARS cannot), the sound quality, the cost of equipment, and the presence or absence of a subscription fee, but they all can provide music. The availability of these media, terrestrial radio in particular, varies across populated areas. Given our conclusion that satellite DARS can provide new and valuable service to the public, and given the overall competitive environment within which it will operate, we are satisfied that licensing two satellite DARS providers will serve the public interest. We agree with commenters, that there should be more than one satellite DARS license awarded.[135] Licensing at least two service providers will help ensure that subscription rates are competitive as well as provide for a diversity of programming voices. The two DARS licensees will compete against each other for satellite DARS customers and will face additional competitive pressure from the other aural delivery media mentioned above. Accordingly, eligible auction participants may acquire only one of the two licenses being auctioned. One license will be for the use of spectrum between 2320 and 2332.5 MHz and the other for 2332.5 though 2345 MHz.

7. Licensing Conditions

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134 Notice, ¶ 38.

135 See Comments of CD Radio at 18-20; Reply Comments of Media Access Project at 13-15.

79. Satellite DARS licensees' authority to operate will be conditioned upon completion of their international coordination obligations. As discussed above,[136] and as we indicated in the Notice, both Canada and Mexico have allocated the 1452-1492 MHz frequency band (L-band) for DARS. Since U.S. satellite DARS systems will operate exclusively in the 2320-2345 MHz frequency band (S-band), coordination between U.S. satellite DARS and Digital Audio Broadcasting systems of adjacent countries is not necessary. We indicated in our Notice that the L-band is used extensively for U.S. Government and commercial mobile aeronautical telemetry operations. Coordination between Canadian terrestrial DARS and U.S. mobile aeronautical telemetry systems at L-band has proven to be challenging.

80. Adjacent countries do, as discussed above, operate terrestrial fixed point-to-point, fixed point-to-multipoint, and mobile aeronautical telemetry systems throughout the S-band. U.S. satellite DARS systems will be required to coordinate with these terrestrial systems currently operating in the 2320-2345 MHz band. Satellite DARS licensees must submit appropriate Appendix 3 material according to the International Radio Regulations to formally complete the international coordination process. This Appendix 3 material will contain the final configurations of the satellite DARS systems.

C. Service Rules for Satellite DARS in the 2320-2345 MHz Band

1. Classification of Service

81. In the Notice, the Commission sought comment on whether satellite DARS licensees should have the flexibility to determine their own regulatory classification depending on the service they are providing or whether there are reasons to justify mandating a particular type of service. We tentatively concluded that there was no reason to require that satellite DARS providers be licensed as common carriers or as broadcasters.[137] We raised a related question, pursuant to a suggestion by the NAB, whether we should require that all licensees offer subscription service and asked for comment on the legal, policy and practical implications of such a requirement.[138]

82. Commenters addressing these questions fall into two general groups. Those supporting implementation of satellite DARS, including the incumbent applicants, advocate that licensees be permitted to determine their own regulatory classification in order to tailor

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136 See Section 3, supra.

137 Notice, ¶¶ 23-4.

138 Notice, ¶ 25.

services to meet customer requirements and to respond to market demands.[139] These commenters also emphasize the extremely high costs of constructing and launching a satellite system and state that licensees cannot afford to be restricted to purely subscription service. They state that they must be allowed to choose their own mix of subscription and advertising.[140] One commenter suggests that satellite DARS licensees be limited to national advertising and be prohibited from accepting local or regional ads.[141] Media Access Project argues that satellite DARS should be classified as broadcasting because the providers use public spectrum and thus should be subject to public interest requirements.[142]

83. Commenters opposing satellite DARS argue that the service should be required to operate on a subscription only basis. NAB, for example, states that although satellite DARS would not be common carriage or broadcasting,[143] providers should be required to restrict their service to subscription offerings in order to lessen the potential adverse impact on terrestrial broadcasters.[144] NAB recognizes that DBS operators have been given the option to offer service as a broadcaster or by subscription but argues that treating satellite DARS like DBS in this regard is not warranted because the services operate in different competitive markets, with DBS subject to much more competition and not able to affect broadcasters as significantly as DARS.[145]

84. The record supports a conclusion that satellite DARS licensees should be able to tailor their services to meet customer needs and that mandating a particular regulatory classification is unwarranted. There is no compelling evidence in the record that would militate in favor of requiring a broadcast classification and in fact it appears that the current applicants favor subscription service. Nor does satellite DARS appear to be a common carrier

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139 Comments of DSBC at 51-52. See Comments of AMRC at 21; CD Radio at 78-82 (stating that satellite DARS is not common carriage or broadcasting); and Primosphere at 32-33.

140 Reply Comments of AMRC at 19; Primosphere indicates that it intends to offer non-subscription, advertiser-supported programming.

141 Comments of Robert T. Wertime at 5.

142 Comments of Media Access Project at 4.

143 Comments of NAB at 45-46. Cf. Comments of Media Access Project at 13-15 (arguing that satellite DARS providers should be regulated as broadcasters); Minority Media & Telecommunications Council at 3-5 (contending that the service should be classified as common carrier with public interest obligations imposed).

144 Comments of NAB at 49.

145 Accord, Comments of New Jersey Broadcasters Ass'n. at 1; The Cromwell Group.

service because much of the programming offered would be subject to the editorial control of the provider. The services proposed by three of the applicants will be neither broadcast or common carrier. Flexibility for licensees to meet market demands is crucial and it may be that the viability of a satellite DARS service will depend on offering a mix of advertiser supported and subscription service. We find that a requirement that satellite DARS be entirely subscription is unwarranted. Mandating that providers charge for their services is not in the public interest and raises significant legal questions if done for the purpose of economic protectionism as advocated by several commenters.[146]

2. Public Interest Obligations

85. The Commission's Notice requested comment on a wide variety of questions regarding the advisability of public interest obligations in the context of this service.[147] We asked, for example, if all satellite DARS providers, including those not operating as broadcasters, should be subject to similar requirements. We solicited comment on the Commission's authority to impose such obligations on non-broadcasters. We requested information on the cost of complying with public interest obligations, and on whether the costs could be so significant as to hamper implementation of the service. Finally, we asked about the types of obligations that apply to terrestrial broadcasters, which offerings would not be included by service providers in an unregulated environment, and whether these requirements increased or decreased profitability.

86. Commenters were divided on whether the Commission should adopt public interest programming obligations for satellite DARS providers. In general, pending satellite DARS applicants proposing non-broadcast service cautioned against imposing obligations.[148] For example, DSBC states that public interest programming obligations are not necessary to ensure diverse public oriented programming.[149] It asserts that the economic and distribution structure of satellite DARS makes it good business to offer programming that regular broadcasters would not offer absent incentives. AMRC also expresses concern that many of the suggested service rules would not result in better service to the public but instead would make service impossible.[150] Primosphere, the only applicant clearly proposing to operate as a broadcaster, states the Commission should strike a balance between ensuring that the public

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146 See National Ass'n of Broadcasters v. FCC, 740 F 2d 1190 (D.C. Cir. 1984).

147 Notice, ¶¶ 27-8.

148 See Comments of AMRC, DSBC, and CD Radio.

149 DSBC Comments at 45.

150 Reply comments of AMRC at 22.

interest is served and assuring that timely introduction of service is not impeded.[151] A non-applicant states that the Commission is not in a position to determine which services should be offered in light of rapidly changing technology and potential consumer services.[152] Although arguing against mandatory offerings, many of the current applicants state that they plan to include public interest programming in their services.

87. Media Access Project ("MAP") urges that the Commission classify satellite DARS as broadcasting to trigger defined statutory public service obligations.[153] In the absence of such a classification, MAP argues that broadcasters' obligations are appropriate. NAB states that imposing public interest obligations on DARS providers will, to some extent, compensate for the loss in local programming that it claims will inevitably result from implementing the service.[154] Individual broadcasters assert that DARS providers will not keep their promises to provide niche programming but instead will offer mainstream services that will compete directly with terrestrial offerings.[155]

88. In response to our request for proposals for possible public service rules, NAB suggested that satellite DARS licensees be held to a "promises v. performance" standard, similar to that formerly required of terrestrial broadcasters. Under this concept, operators would provide the Commission with a list of programming they propose to offer and to specifically describe ethnic or niche offerings included. They would then be subject to a periodic public interest review to determine if they have made good on their promises and to justify any substantial variations from their proposals.[156]

89. Bonneville International Corp., a company holding broadcast licenses, advocates requiring that music programmed channels carry news, information, public service announcements and public service programming. Several commenters urge that satellite

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151 Comments of Primosphere at 35. Primosphere states that it intends to donate one music quality channel to public broadcasting, one voice quality channel to a visually impaired reading service and one music channel to children's programming.

152 Comments of Citizens for a Sound Economy Foundation.

153 Media Access Project Comments at 13-21. See further discussion of Media Access proposals infra.

154 Comments of NAB at 51.

155 Comments of WEMP, WAZZ-FM, WJJY Radio, WMUS AM/FM WQDR, WTON.

156 Comments of NAB at 52.

DARS providers be required to comply with Equal Employment Opportunity requirements.[157] National Public Radio advocates either a specific reservation of channel capacity for noncommercial or educational programming or a commitment to provide a minimum amount of educational cultural, and informational programming to unserved or underserved areas.[158] The suggestion is supported by the Minority Media and Telecommunications Council which states that satellite DARS licensees should be required to set aside channels for noncommercial public access and for minority entrepreneurial access. One commenter, a terrestrial radio station operator advocated that satellite DARS meet certain requirements for each different programming signal offered and for each different community served.[159] NAB points out that there are certain types of local public interest programming that a national service like satellite DARS can neither provide nor replace.[160] Entertainment Communications advocates a requirement that satellite DARS licensees serve "niche" audiences.

90. As explained above, in allocating spectrum and adopting service rules for the satellite DARS service, we have relied on the representations of satellite DARS applicants that they will provide audio programming to audiences that may be unserved or underserved by currently available audio programming. Thus, applicants have proposed new choices in audio programming which may be beneficial for the mobile public and for unserved and underserved communities, particularly in rural or remote areas. We also have considered whether it is appropriate to apply to DARS public interest requirements similar or analogous to those that govern terrestrial radio broadcasters.

91. With regard to non-programming obligations, we conclude that satellite DARS licensees must comply with the Commission's equal employment opportunity requirements. The rationale behind these requirements is a belief that a licensee can better fulfill the needs of the community, whether local or national, if it makes an effort to hire a diverse staff, including minorities and women.[161] This rationale applies with equal force to satellite DARS. We note that no commenters opposed the imposition of EEO requirements. The Commission has a pending rulemaking proposing revision to its EEO rules.[162] Licensees in this service will be required to comply with the current rule and with any changes adopted when the rulemaking is completed.

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157 Comments of Minority Media and Telecommunications Council, Bonneville International Corp., WNNJ.

158 Comments of NPR at 4.

159 Comments of WNNJ.

160 Comments of NAB at 50.

161 Streamlining Broadcast EEO Rules and Policies, 11 FCC Rcd 5154 (1996).

162 Id.

92. With regard to programming obligations, we agree with some of the commenters that satellite DARS service is likely to provide a new forum for political debate in this country. To ensure that there is fair treatment of federal political candidates that may seek to use this new forum, we believe that satellite DARS licensees, whether they operate on a broadcast or subscription basis, should comply with the same substantive political debate provisions as broadcasters.[163] These provisions are the federal candidate access provision, Section 312(a)(7), and the equal opportunities provision, Section 315. As the Supreme Court stated in upholding Section 312(a)(7) against constitutional attack, these political broadcast provisions "make a significant contribution to freedom of expression by enhancing the ability of candidates to present, and the public to receive, information necessary for the effective operation of the democratic process."[164]

93. While we are not adopting additional public interest programming obligations at this time, we reserve the right to do so. Licensees are specifically on notice that the Commission may adopt public interest requirements at a later date. If additional public interest obligations are found to be warranted, one option would be to adopt rules similar to those Congress enacted for DBS providers, including a 4-7% set-aside of capacity for noncommercial educational and informational programming.[165] Another option would be to hold satellite DARS licensees to a 'promise vs. performance' standard.[166]

3. Ancillary Services

94. In the Notice, we discussed the possibility of satellite DARS providers offering non-DARS, or ancillary, services. We sought comment on what restrictions, if any, should apply to such services and on how to monitor compliance with any restrictions.[167] In response, commenters favored allowing provision of ancillary services. Current satellite DARS applicants urged that the Commission allow flexibility to provide such services.[168] Other commenters stated that allowing ancillary services will promote full and efficient use of

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163 See 47 U.S.C. 309(a), 307(a); see also 47 U.S.C. 154(i), 303(b), 303(r).

164 CBS v. FCC, 453 U.S. 367, 396 (1981).

165 See 47 U.S.C. § 335.

166 See Comments of NAB at 54-56.

167 See Notice, ¶¶ 29-30. Examples of ancillary services envisioned for satellite DARS include high speed broadcast data, location based geographic information, electronic graphic/visual information, voice mail and alpha-numeric messages.

168 See Comments of CD Radio at 85-87; Comments of DSBC at 52-53.

the spectrum and could lower the price of DARS service, particularly in the early stages as satellite DARS is established.[169]

95. Some commenters suggested particular services that would be complementary. For example, Ford Motor Co. suggested allowing data services.[170] Radio Order Corp. urges us to allow song related voice messaging that would permit the listener to access information on a particular song during the uninterrupted music.[171] The USDA/Forest Service National Weather Program suggests that satellite DARS providers could dedicate a channel to broadcasting potentially life-saving forest fire and emergency information.[172]

96. The applicants have proposed a mix of ancillary services. We agree with the commenters who argue that allowing flexibility consistent with the allocation will allow providers to tailor service offerings to meet consumer needs. Because the United States successfully obtained an international allocation for satellite DARS at WARC-92, we would be concerned about any use of the spectrum that is inconsistent with the international allocation.[173]

4. Technical Qualifications

Service Area

97. The Notice contained no specific proposal for satellite DARS service area requirements. It did, however, ask whether to require satellite DARS systems to provide 50-state coverage or 50-state plus Puerto Rico/Virgin Islands coverage, as we do in the fixed-satellite service. We noted that two satellite DARS applications propose service solely to the 48 contiguous states of the United States (CONUS). Two other applicants propose coverage of the CONUS, Alaska, Hawaii, Puerto Rico and the Virgin Islands.

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169 Comments of Orbital Sciences Corp. at 3-4.

170 Comments of Ford Motor Corp.

171 Comments of Radio Order Corp. at 2. We note that voice synthesized audio would be considered part of the audio programming offered by a satellite DARS licensee. See Ex Parte letter from Radio Order Corporation, dated April 3, 1996.

172 Comments of USDA Forest Service.

173 See Final Acts; 47 C.F.R. sections 2.1, 2.106. See also, Allocation Order, 10 FCC Rcd 2310.

98. CD Radio and Primosphere assert that the Commission should not mandate that first generation satellite DARS systems provide service beyond the CONUS.[174] Primosphere adds that requiring full 50-state coverage would require the use of satellite spot beams and additional spacecraft power. Primosphere also noted that most 12-14 GHz (Ku-band) and DBS licensees provide CONUS only coverage. CD Radio asserted that the service area is market-driven and that other applicants propose to serve Alaska, Hawaii, Puerto Rico, and the Virgin Islands CD Radio indicates also that its second generation design will include an expanded service area.

99. One benefit of a satellite system is its ability to provide nation-wide service. We recognize that 50-state coverage is not mandatory for all satellite services and a service area requirement beyond full CONUS coverage may not be practical for first generation satellite DARS systems. All of the pending applications for satellite DARS propose at least full CONUS coverage, however, and there appears to be support for such a minimum requirement. Accordingly, we conclude that satellite DARS licensees' systems must provide, at a minimum, full CONUS coverage. We strongly encourage coverage to other areas or territories of the United States where practical to do so for first generation systems.

Service Link Margin

100. A concern identified in the Notice was that satellite DARS signals be available to listeners, especially mobile ones, at every location nationwide. We noted the service link margin is related to the percentage of service availability.[175] We also noted that there was significant comment on the pending satellite DARS applications which questioned the appropriate service link margin necessary for reception in a mobile environment. We therefore proposed in our Notice that satellite DARS applicants be required to identify the service link margin for their systems and demonstrate that their systems are capable of providing that service link margin in a mobile environment, under clear sky conditions, to the geographic areas they will serve.[176] We also sought comment on whether a specific value should be used to define an adequate service link margin for the specified service areas in urban and suburban environments and, if so, what that value is and analysis to support that value. Technical analyses were not included in initial comments to demonstrate that a particular service link margin would be necessary for mobile reception in urban and suburban environments.

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174 CD Radio Comments at 89 and Primosphere Comments at 38, n.80.

175 See Notice, ¶ 44. Service link margin identifies the amount of excess received power available to the end user receiver to reproduce the information transmitted by the satellite.

176 Notice, ¶ 46.

101. Pending applicants assert that satellite DARS operators will have an incentive to provide sufficient margin to deliver the highest quality audio and still permit low-cost manufacture of receiver equipment.[177] Noting also that the amount of service link margin chosen by satellite operators is affected by a variety of factors, such as use of modulation and access techniques, satellite diversity, transmission schemes, intended audience, and use of terrestrial repeaters,[178] it would be difficult for satellite operators to define one specific value that should be used. We therefore will not require that satellite DARS licensees be capable of providing a specific value of service link margin for a given geographic area and we withdraw our proposal regarding service link margin. We will only require satellite DARS applicants to provide the information on their service link budgets that is already required by Section 25.114(c)(9) of our rules.

Receiver Inter-operability

102. In general, it is our policy to avoid mandating the use of one form of technology. We conclude it is appropriate to follow that policy here because it will allow flexibility for satellite DARS licensees in designing their satellite DARS systems, and will promote innovative system designs. Indeed, in the Notice, we proposed to allow licensees to use the channelling plans, modulation schemes and multiple entry techniques of their choice.[179] One of the underlying reasons for proposing a band segment approach to licensing the satellite DARS spectrum was to avoid imposing complex sharing arrangements among satellite DARS licensees that may result due to the diversity in the proposed satellite DARS designs. The diverse modulation and channelling techniques proposed in the pending satellite DARS applications, however, led us to seek comment in the Notice on the issue of receiver inter-operability and standards for satellite and terrestrial DARS.[180]

103. We indicated our concern that licensing diverse satellite DARS systems could increase the cost of manufacturing a receiver that is compatible with all competing satellite DARS technologies and terrestrial formats.[181] We therefore proposed that each applicant demonstrate that its satellite DARS system is capable of remotely tuning its individual mobile,

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177 See CD Radio Reply at 54.

178 See Primosphere Comments at 39 and AMRC Comments at 24.

179 Notice, ¶ 80.

180 Notice, ¶ 51.

181 Notice, ¶ 49.

fixed, and/or portable receivers across the allocated bandwidth 2310-2360 MHz.[182] This rule would have been necessary if we were to license more than one band segment to a particular satellite DARS licensee, (whether as an interim assignment or in the event that a license is dismissed and the spectrum is re-divided pro-rata[183]) but in view of our conclusion to license only two satellite DARS systems through competitive bidding, and not to permit interim frequency assignments, such a provision is no longer required. We adopt, however, the principle behind our proposed rule that satellite DARS licensees are required to design a receiver which would accommodate all satellite DARS providers. By promoting receiver inter-operability for satellite DARS, we are encouraging consumer investment in satellite DARS equipment and creating the economies of scale necessary to make satellite DARS receiving equipment affordable. This rule also will promote competition by reducing transaction costs and enhancing consumers' ability to switch between competing DARS providers. We decline to adopt a specific standard for satellite DARS receiver designs, though. This will allow licensees the flexibility to determine the most cost effective way to meet our receiver-interoperability requirements. We do not mandate that satellite DARS receivers be capable of receiving terrestrial broadcasting formats. Terrestrial and satellite DARS are at different developmental stages and we do not want to impede implementation of either service.

104. Parties contend that Commission adoption of a single, industry-developed transmission standard for satellite DARS will keep receiver costs down, minimize design complexity, and encourage competition in the marketing of receivers.[184] The Electronic Industry Association (EIA) maintains further that satellite DARS receivers should be designed so that consumers can seamlessly switch between satellite and terrestrial based DARS systems.[185]

105. Satellite DARS applicants share different views regarding the Commission's role in the process of receiver development. CD Radio asserts that receiver inter-operability is in the clear economic interests of all satellite DARS providers and it expects that its receiver will be fully tunable in the sense that the consumer can select the service provider of

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182 We also proposed that a satellite DARS applicant demonstrate how it will implement the forward signalling command for its receivers to select and tune to any center frequency(ies) in the allocated bandwidth. See Notice, Appendix I, Proposed Section 25.144(2)(ii).

183 See Notice, ¶ 79.

184 See Ford Comments at 3 and EIA Reply at 9. See also Ex Parte presentation by CEMA to International Bureau staff on September 18, 1996.

185 See EIA Comments at 7.

their choice.[186] AMRC contends that creation of a common receiver capable of tuning in the entire DARS band is important in promoting consumer acceptance of the technology.[187] Given the market incentive for receiver compatibility, DSBC asserts that it is likely that a compatible receiver standard for satellite DARS will be developed without regulatory intervention.[188] Primosphere adds that it is committed to working with the appropriate industry organizations to develop a common receiver standard and therefore Commission action is not necessary.[189] In a related matter, CD Radio seeks confirmation from the Commission that consumers may rely on the authorization of a satellite DARS provider and need not obtain any additional license or registration for receive-only earth stations used to obtain the service.[190]

106. As an alternative to this Commission mandating standards we will require that a satellite DARS applicant, in its application, certify that its satellite DARS system will include a receiver design that will permit users to access all licensed DARS systems that are operational or under construction. Satellite DARS licensees, during the construction of their satellite systems, will have an opportunity to work among themselves toward a final receiver design. We agree with commenters that it is in the interest of the satellite DARS licensees, and consumers, for the licensees to come to agreement on a single DARS receiver design. We also agree with commenters that, alternatively, a single transmission standard would be in the interest of the satellite DARS providers and consumers, independent of whether it is developed by the Commission or by industry, but we will not mandate use of a certain technology.[191] If satellite DARS licensees redesign their systems to use conforming transmission technology, receiver complexity would be minimized and receiver costs would be lowered correspondingly. We believe that, at the very least, consumers should be able to access the services from all licensed satellite DARS systems and our rule on receiver inter-operability accomplishes this. We also agree with CD Radio that it is unnecessary for satellite DARS consumers to file for a license for their receive-only terminals. Indeed, the

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186 See CD Radio Comments at 90.

187 See AMRC Comments at 20.

188 DSBC Comments at 48.

189 Primosphere Reply at 24-25.

190 See CD Radio Reply at 53, n.146. CD Radio notes that licensing of receiver-only earth stations is not required by the Commission (referencing Part 25 of the Commission's rules, Section 25.131(b)).

191 We conclude that the satellite DARS licensees are in the best position to make necessary trade-offs between use of different technologies to implement their satellite systems. See discussion of design trade-offs in Spectrum Requirements and Economic Viability, supra, Section B.2.

Commission has not licensed receive-only earth stations for years in an effort to deregulate such operations.[192]

107. Terrestrial broadcast and satellite DARS services are at different stages of development, however, and we do not intend to add delay to the progress of the satellite service with further regulatory intervention by requiring that receivers be tunable to terrestrial broadcast signals. Testing and evaluation of proposed digital audio radio technologies has been on-going since 1991.[193] We urge satellite DARS licensees to take this information into account before they finalize their system and receiver designs. The comments indicate that satellite DARS licensees will continue to participate in the industry groups related to their service and we have good reason to believe that this is sufficient to facilitate the design of a state-of-the-art satellite DARS receiver.

Data Compression Rates

108. The applicants propose various coding rates to produce near compact disc (CD) quality audio.[194] Some applicants propose to use variable data rates to transmit a mix of audio formats where the bandwidth necessary to produce one CD quality channel, for example, would be used to provide several high quality channels at data rates which are lower than those necessary to produce CD quality.[195] We tentatively concluded that the use of variable data rates would promote efficient use of the spectrum and that satellite DARS licensees should be permitted to implement a mix of programming formats at variable data rates. We reflected this in our proposal to require satellite DARS licensees to identify which coding scheme and coding rate(s) they plan to implement on their satellite DARS systems and require those satellite DARS systems which intend to offer audio formats other than CD quality to be capable of transmitting lower quality audio at lower data rates. We proposed to refrain from requiring a particular level of audio quality or other quality for satellite DARS and we sought comment on our tentative conclusions. We adopt, today, a rule that is consistent with our proposal for variable data rates.

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192 See 47 CFR § 25.131.

193 See Notice, ¶ 48. The Electronic Industry Association (EIA) has been instrumental in evaluating and testing terrestrial and satellite DARS technologies. Indeed, the EIA expects to complete the technical evaluation of DARS technologies and issue a Report to the Commission, including recommendations, in the near future. See EIA Comments at 10.

194 See Notice, ¶ 52.

195 These high quality channels would be comparable to FM stereo or FM monaural and could be used to provide less demanding radio formats such as talk radio, sports and news. See Notice, ¶ 53, n.53.

109. Comments generally support the Commission proposal to allow use of variable data rates depending on the programming being offered and not to define a particular level of quality for DARS based on data rates.[196] CD Radio asserts that satellite DARS licensees should be permitted to rely on market preferences to determine the data rates to use for particular formats and to determine the quality of the service.[197] AMRC agrees with the Commission proposal because it intends to include some non-CD quality channels in its system.[198] In this respect, CD Radio proposed a modification to our original proposal that would require a satellite DARS applicant to identify the compression rate it will use to transmit audio programming whether CD or other quality.[199] We adopt this proposal and extend it to require licensees to identify the compression rates used for non-audio formats.

5. Milestone Qualifications and Reporting Requirements

110. In the Notice, we proposed to adopt financial qualifications and milestone requirements for satellite DARS licensees.[200] Because of our decision to auction licenses, financial qualifications are unnecessary.[201] However, we believe that strict adherence to satellite construction and operational milestones will assure that licensees are proceeding with their proposals and spectrum is used efficiently. Because of the long lead time necessary for satellite construction, we proposed that satellite DARS licensees begin construction of their space stations within one year, launch and begin operating their first satellite within four years, and begin operating their entire system within six years. We also proposed that licensees file annual reports on the status of their systems. The current applicants support the rules proposed in the Notice.[202] Accordingly, we adopt the requirements as proposed.

6. License Term

196 See CD Radio Comments at 93, Primosphere Comments at 40, and DSBC Comments at 48.

197 See CD Radio Comments at 93.

198 AMRC Comments at 25.

199 CD Radio Comments, Appendix E, at 6.

200 Notice, ¶¶ 88-93.

201 Id., ¶ 93.

202 Joint Comments of Applicants at 4.

111. In the Notice, we proposed that licenses for satellite DARS space segment facilities would be issued for ten years.[203] We also noted that licensees choosing to operate as broadcasters would be limited by statute to a shorter term.[204] Adoption of our original proposal would place DARS licensees that choose to be broadcasters at a disadvantage by giving them a shorter term. In addition, two different terms could cause confusion if an operator decided to change the mix of services it offered and might hamper the flexibility we intended that licensees should have in choosing formats.[205] Accordingly, because the Communications Act limits broadcast license terms to eight years,[206] we have determined that all satellite DARS license terms should be eight years. The license term will commence when each satellite is launched and put into operation. In addition, as proposed in the Notice,[207] individual satellite DARS receivers will not be licensed.

7. Technical Rules

112. As one of the pending satellite DARS applicants indicates, satellite systems are a collection of technical trade-offs between satellite power, number of channels, data rates, service link margin and bandwidth.[208] Therefore, the greater the flexibility in our technical rules, the greater the flexibility satellite DARS licensees will have in designing their systems in such a way as to meet their business plans and marketing goals. The technical rules adopted today will offer satellite DARS licensees sufficient flexibility to make necessary trade-offs and to implement systems that are viable and competitive.

Power Flux-Density Limits

113. We proposed in the Notice not to apply power flux-density (pfd) limits on satellite DARS networks and we believe the record supports our tentative decision.[209] While initially CD Radio maintained that coordination of satellite DARS systems with adjacent countries would be facilitated if all systems were required to meet a pfd level at the Earth's surface of -139 dB(W/m^2/4 kHz), CD Radio now contends that it is not necessary for the

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203 Notice, ¶ 116.

204 At the time the Notice was adopted, that term was seven years but has since been changed to eight. 47 U.S.C. §307(c)(1).

205 See, supra, ¶ 82.

206 47 U.S.C. § 307(c)(1).

207 Id.

208 Reply Comments of AMRC at 17.

209 See Notice, ¶ 65.

Commission to re-open the issue of required pfd limits since it will be part of the coordination process.[210] Others agree. DSBC, for instance, maintains that experience has shown that the flexibility in the international coordination process is far superior to the rigidity of pfd limits.[211] Accordingly, Satellite DARS licenses will be conditioned on the completion of international coordination with adjacent countries.

114. It is clear that each satellite DARS licensee will need to operate its satellite(s) at a pfd level that is high enough to provide sufficient service availability and yet low enough to coordinate with terrestrial services in adjacent countries. Coordination with adjacent countries becomes an important issue because the pfd values characteristic of proposed satellite DARS systems exceed the threshold levels that have been identified by foreign administrations to protect their existing terrestrial services. Our discussion of coordination, above, provides satellite DARS applicants with a detailed understanding of the coordination issues in the 2320-2345 MHz band.[212] The applicants are in a better position than the Commission to make necessary power trade-offs to implement their satellite DARS systems. Moreover, since we are licensing satellite DARS providers in two separate frequency assignments, the failure of one licensee to complete coordination with adjacent countries in a timely fashion will not delay the coordination of the other licensee's system. In light of the above, we believe that adoption of a specific pfd limit is unnecessary. Satellite DARS applicants are reminded, however, that they are required to identify in their modified satellite DARS system applications the pfd at the Earth's surface from their spacecraft according to Section 25.114 (c)(11) of the Commission's rules.

Out-of-Band Emissions

115. Satellite licensees are required to suppress out-of-band and spurious emissions[213] from their space stations to the levels specified in Section 25.202(f) of the Commission's Rules. We indicated in the Notice that techniques such as spectral shaping, coding, offset quadraphase modulation and filtering, would be useful in mitigating out-of-band

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210 See Comments of CD Radio at 97.

211 DSBC comments at 50.

212 See, supra, Section B.3.

213 An out-of-band emission is radio frequency energy on a frequency or frequencies immediately outside of the necessary bandwidth which results from the modulation process, but excluding spurious emissions. A spurious emission is radio frequency energy on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions exclude out-of-band emissions.

emissions.[214] We sought comment, however, on whether the out-of-band emission limits in Section 25.202(f) would be sufficient to protect radiocommunication services in bands adjacent to the 2310-2360 MHz band, particularly deep space operations below 2310 MHz and U.S. MAT operations above 2360 MHz.

116. Cornell University asserts in its comments that the Arecibo Observatory in Puerto Rico, which it operates for the National Science Foundation in the 2370-2390 MHz band, would require greater protection from satellite DARS than that which is currently required by Section 25.202(f).[215] Specifically, Cornell requests that, as a minimum, the Commission require the out-of-band emission limits of Section 25.202(f)(3) for satellite DARS emissions beyond the 2370 MHz band edge. It requests that a rule for spurious emissions, consistent with those being considered by ITU-R Task Group 1/3[216] be applied to satellite DARS as well. This would require an additional 9 dB of attenuation below the out-of-band emission limits required by Section 25.202(f).[217]

117. Cornell's calculations assume that a satellite DARS licensee will be authorized to operate at a center frequency of 2355 MHz with a bandwidth of 8 MHz. Considering that satellite DARS systems will be licensed below 2345 MHz, and that we are not requiring the provision of satellite DARS to Puerto Rico and the Virgin Islands, which offers further protection to the Arecibo Observatory, attenuation of out-of-band emissions beyond the limits already required by Section 25.202(f) may not be necessary. It would be premature for the Commission to require satellite DARS licensees to meet the spurious emission limits which are currently in place as "design guidelines" and which may be reviewed again by ITU-R Study Groups. The TG 1/3 Recommendation that Cornell cites in its comments is a draft Recommendation and the issue of spurious emissions will not be finalized until the 1999 international Radiocommunication Assembly.

118. We therefore will only require satellite DARS licensees to meet out-of-band and spurious emission limits which are contained in Section 25.202(f) of our Rules. Satellite DARS licensees should, however, take cognizance of the TG 1/3 "design guidelines" and the Arecibo deep space operations in the 2370-2390 MHz when designing, constructing and

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214 See Notice, ¶ 69, n.69.

215 See Ex Parte Presentation of Cornell University (Cornell) and the Arecibo Observatory, dated March 20, 1996.

216 ITU-R Task Group 1/3 (TG 1/3) is responsible for developing spurious emission limits to protect the Radio Astronomy service. TG 1/3 completed its work in November 1996.

217 See Cornell Ex Parte presentation. Cornell indicates that the Arecibo planetary radar system has harmful interference thresholds similar to the levels necessary to protect Radio Astronomy.

operating their space stations. In a related matter, the pending satellite DARS applicants assert that they can each operate without causing harmful interference to one another.[218] Since the pending satellite DARS applicants propose a band segment licensing approach, we presume that the out-of-band emission limits of Section 25.202(f) would provide for interference-free, intra-service satellite DARS operation. The issue of out-of-band emission limits to protect satellite DARS receivers is addressed in the Wireless Communication Services proceeding.[219]

Telemetry Beacons

119. We sought comment in the Notice on a suitable location for satellite DARS telemetry beacons. We proposed in the Notice that each system operator reduce its bandwidth occupancy by 0.1 MHz to create two 0.2 MHz assignments adjacent to the edges of the satellite DARS band for location of telemetry beacons.[220] We also proposed an alternative location for all satellite DARS telemetry beacons at the lower edge of the 2310-2360 MHz band, considering our tentative conclusion not to immediately license the lower 10 MHz for satellite DARS. Our alternative proposal would put fewer constraints on the satellite DARS licensees (i.e., they would no longer have to reduce their bandwidth occupancy to accommodate telemetry beacons), but we indicated that further constraints would be placed on any future licensee of the lower portion of the band. We requested comment on our proposals for satellite DARS telemetry beacons and we requested comment on alternative locations.

120. In its comments, DSBC suggests that, alternatively, the 3697-3699 MHz band would be suitable for satellite DARS telemetry beacons.[221] It contends that the 3697-3699 MHz band could readily be coordinated for satellite DARS telemetry beacons thereby retaining the total DARS band for service links. CD Radio, in its comments, proposes a modification to the satellite DARS telemetry beacon proposal in the Notice. According to CD Radio's proposal, satellite DARS licensees *may* reduce their assigned bandwidth occupancy to provide telemetry beacons.[222] No other alternatives were identified for the location of satellite DARS telemetry beacons.

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218 See Joint Comments of Applicants at ¶ 2.

219 See WCS Order, ¶¶ 123-144.

220 See Notice, ¶ 82.

221 See DSBC comments at 53. As DSBC correctly indicates the use of the band by the FSS is limited to International, inter-Continental systems, and subject to case-by-case electromagnetic compatibility analysis according to footnote US245 in Section 2.106 of our Rules. DSBC fails to indicate, however, that the band is also shared with Radiolocation and Aeronautical Radionavigation services on a primary basis.

222 See CD Radio Comments, Appendix E, at 9 (emphasis added).